Cost / Benefit Analysis: Updating the Michigan Uniform Energy Code by Adopting Chapter 11 of the International Residential Code (as Amended) for New Residential Building Construction in Michigan

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Summary

This report presents a cost/benefit analysis related to the adoption of the revised Michigan Uniform Energy Code (revised MUEC), which incorporates Chapter 11 of the International Residential Code (IRC) (as amended) for new residential home construction in Michigan. The revised MUEC is scheduled to replace the current MUEC with an effective date of February 28, 2005.

This report replaces the previous cost/benefit analysis released by the Michigan Energy Office in March 2004. The revised cost/benefit analysis has been completed for the following reasons:

1) The revised MUEC, Table N1102.1 now indicates basement wall treatment can be accommodated by either a "continuous insulation" application, or a "cavity insulation" application. This report reflects basement insulation options.

2) The March 2004 version of the cost/benefit analysis showed all sample homes only meeting the requirement of R-13 in above grade walls. This December 2004 report indicates sample homes featuring either R-21 above grade wall compliance, or a performance measure approach indicating that the home complies with the revised MUEC.

3) The revised MUEC section N1101.2.1 specifically provides performance compliance options, giving builders alternatives to meeting the prescriptive measures identified in Table N1102.1. Such performance options are included with the Home Energy Rating examples featured in this report.

4) More detailed descriptions of energy efficient labor and material costs are provided by the Home Energy Raters who supplied sample home case studies for this report. This addition makes clear the sources for costs associated with home energy efficiency construction measures.

In completing this cost/benefit analysis, the Energy Office has referenced Michigan Compiled Laws, Section 125.1502a, otherwise referred to as the "Stille-DeRossett-Hale Single State Construction Code Act". More specifically, definitions from Section 2a (n) served as the guideline for this analysis.

- The perspective of a typical first-time home buyer
- Fuel price increases that do not exceed the assumed general rate of inflation
- The buyer of the home qualifying to purchase the home before the addition of the energy efficient standards would still qualify to purchase the same home after the additional cost of the energy-saving construction features
- Benefits and costs over a 7-year time period
- Costs of principal, interest, taxes, insurance, and utilities will not be greater after the inclusion of the proposed cost of the additional energy-saving construction

features required by the proposed energy efficiency rules as opposed to the provisions of the existing energy efficiency rules

This report includes energy analysis information relevant to two types of homes. The sample homes include: 1) a smaller sized home representing a house likely to appeal to a first time homebuyer, and 2) a medium sized home likely to appeal to a variety of different homebuyers. Two different analyses were conducted for each sample home.

Analysis 1: Benefits and costs from increasing the energy efficiency of a home built to the current MUEC standards by applying the building envelope requirements of the revised MUEC. **[This represents the PRESCRIPTIVE approach.]**

Analysis 2: Benefits and costs from increasing the energy efficiency of a home built to the current MUEC standards by applying cost-effective energy efficiency measures that equal or exceed energy performance outcomes when the prescriptive requirements of the revised MUEC are met. **[This represents the PERFORMANCE approach as referenced in section N1101.2.1 and N1105.1 of the revised MUEC.]**

Home Energy Rating System (HERS) improvement analysis reports were used for this cost benefit document. HERS is a standardized system for rating the energy-efficiency of residential buildings. HERS is currently governed by two national industry standards: 1) the Mortgage Industry HERS Accreditation Procedures, and 2) the Residential Energy Services Network (RESNET) Training and Certifying Standards.

The HERS improvement analysis reports used in this cost benefit document were completed by four Michigan professionals certified by Energy Efficient Homes Midwest, a RESNET accredited home energy rating program. A total of twenty Improvement Analysis Reports for the two different sample homes (first time buyer and standard sized homes) were provided by the home energy raters. The twenty Improvement Analysis Reports represent ten prescriptive approaches, and ten performance approaches to meeting the revised MUEC.

The Raters used REM/Rate Residential Energy Analysis and Rating Software for their reports. This software allows Raters to enter data that reflects all costs associated with energy efficiency-related construction improvements used in the home to achieve levels of energy performance that meet the current MUEC standards and the standards of the revised MUEC. In their analysis, the Raters factored in current utility costs for the location of the sample house.

Four different Home Energy Raters chose sample homes from five different locations throughout the State, assuring that examples of homes used in their reports would represent the range of climate conditions and economic variables that exist throughout Michigan. The Energy Office took the Improvement Analysis Reports submitted by the Home Energy Raters and completed the cost/benefit analysis using the criteria defined in the Stille-DeRossett-Hale Single State Construction Code Act. Both the Improvement

Analysis Reports completed by the Home Energy Raters and the worksheets completed by Energy Office staff are included in this report as attachments.

The complete analysis of the ten sample homes (twenty home examples showing both prescriptive and performance methods) indicate that the average net benefit to a homeowner with a home built to meet the requirements of the revised MUEC is **$1,046** within the first seven years. The net benefit is determined by reducing energy costs by an amount that exceeds the construction-related cost increases. The table on page four of this document indicates the net benefits for each of the homes analyzed. Out of twenty home examples, eighteen featured positive net cost savings within the first seven years. All ten of the sample homes indicated code compliance by using either the prescriptive method or the performance method.

Construction cost increases and energy savings will vary depending on many factors including location, energy prices, house size and characteristics, material costs, labor costs and the energy efficiency measures used to comply with the revised MUEC. This report referenced housing examples that effectively included the above-mentioned variables. Additionally, a significant improvement in pollution reduction can be achieved by having new residential construction standards meet the requirements of the revised MUEC.

Residential Energy Code Analysis
Benefits & Costs During the First 7 Years

House	Mortgage Costs Related to Energy Efficiency & Other Costs	Energy Cost Savings and Other Savings	Net Cost Savings During the First 7 Years
Zone 1			
Grand Rapids – First Time (Prescriptive)	$3,733	$2,923	- $810
Grand Rapids – First Time (Performance)	$1,741	$2,878	$1,137
Hesperia – Standard (Prescriptive)	$2,332	$1,142	- $1,190
Hesperia – Standard (Performance)	$946	$963	$17
Owosso – First Time (Prescriptive)	$2,033	$2,061	$28
Owosso – First Time (Performance)	$637	$1,219	$582
Williamston – Standard (Prescriptive)	$2,461	$5,299	$2,838
Williamston – Standard (Performance)	$1,447	$4,374	$2,927
Pontiac – First Time (Prescriptive)	$1,660	$2,962	$1,302
Pontiac – First Time (Performance)	$2,029	$2,806	$777
Hadley – Standard (Prescriptive)	$1,920	$3,620	$1,700
Hadley – Standard (Performance)	$2,296	$4,787	$2,491
Zone 2			
Traverse City – First Time (Prescriptive)	$2,663	$3,340	$677
Traverse City – First Time (Performance)	$1,781	$2,628	$847
Traverse City- Standard (Prescriptive)	$2,967	$3,370	$403
Traverse City- Standard (Performance)	$2,225	$3,554	$1,329
Zone 3			
Marquette – First Time (Prescriptive)	$2,807	$3,432	$625
Marquette – First Time (Performance)	$1,803	$3,226	$1,423
Marquette – Standard (Prescriptive)	$3,160	$4,199	$1,039
Marquette – Standard (Performance)	$2,250	$5,035	$2,785
Average			**$1,046**